5.13 FLOODPLAINS

This section provides an analysis of the effects that the proposed Build Alternatives would have on floodplains and flooding in the project vicinity, and addresses the changes to the affected drainages and their associated floodplains. Changes to watershed boundaries and drainage patterns, increases in impervious surface area, modifications to the Willow-Higgins Creek, Crystal Creek, and Bensenville Ditch channels, and changes in the configuration and capacities of detention basins, can affect the potential for flooding in the three watersheds within the Airport property and in downstream areas.

5.13.1 Background and Methodology

Executive Order 11988, *Floodplain Management*, defines floodplains as:

> the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

This area, which is also called the base floodplain, is the area that would be inundated by the floodwaters of a 100-year flood event. Floodways are contained within floodplains.

Floodplains store water during storm events and help dissipate energy associated with floodwaters. According to Executive Order 11988, Federally approved actions must be designed to minimize or mitigate the risk of loss or adverse impacts associated with floods, and must avoid encroachment on the 100-year floodplain unless no practical alternative exists.

This section describes the floodplain resources as they currently exist after the recent construction of Structure 140 (also known as the Willow-Higgins Reservoir) and the Touhy Avenue Detention Basin, which were undertaken by the City of Chicago Department of Aviation (DOA) and completed in 2004.[1]

5.13.1.1 Regulatory Context

The Federal Emergency Management Agency (FEMA) is the Federal government agency charged with floodplain management. FEMA coordinates with the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) on the designation of floodplain boundaries within the State of Illinois. IDNR-OWR also regulates development within the floodway and, through an administrative process, concurs with the latest FEMA map revisions. The IDNR-OWR criteria for floodplain delineation are more stringent than the minimum requirements of the National Flood Insurance Program as administered by FEMA.[2] The most

[1] TR20/WSP2, Existing Conditions, Willow-Higgins Reservoir, Both Reservoirs (CD), CTE Engineers, March 27, 2001.

[2] 17 IAC 3708, Floodway Construction in Northeastern Illinois.

recent guidance from IDNR-OWR was used for the determination of the existing 100-year floodplains at the Airport.

In assessing existing floodplain boundaries, IDNR-OWR requires use of the "best available information," which it often possesses in its own records and databases. IDNR-OWR information was used for floodplains associated with Crystal Creek and Bensenville Ditch. For the floodplain associated with Willow-Higgins Creek, a detailed study was recently performed on behalf of the Airport by Consoer Townsend Envirodyne Engineers (CCT) that included the North Airfield Drainage Improvements, the construction and operation of Structure 140, and the construction and operation of the Touhy Avenue Detention Basin. This study was used to determine the 100-year floodplain for Willow-Higgins Creek upon completion of all of these drainage improvements on the North Airfield.[3] The City's recent submittal to FEMA requested a Conditional Letter of Map Revision (CLOMR) to show the extent of flooding in the event of a 100-year storm upon completion of these drainage improvements on the North Airfield.[4] **Exhibit 4.4-4** shows the 100-year floodplain for Willow-Higgins Creek upon completion of the drainage improvements on the North Airfield.

Executive Order 11988, *Floodplain Management,* directs Federal agencies to "take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains…."

Executive Order 11988 and the U.S. Department of Transportation's (USDOT's) Implementation Order 5650.2 direct federal agencies to avoid encroachments into the 100-year floodplains wherever practicable. If a project under Federal review does propose an encroachment into the 100-year floodplain, it must be explained why the development is proposed and why alternatives avoiding floodplain impacts are not considered practicable. The analysis must also provide an analysis of the floodplain impacts and describe the mitigation measures needed to control the impacts,[5] and consider any risk to, or resulting from the proposed projects, including the long term loss of available flood storage, if any.

The City of Chicago adopted a floodplain ordinance that correlates with FEMA regulations. The City of Chicago's Department of Environment is responsible for administering flood control regulations within the 100-year floodplain in the City of Chicago. No development within the floodplain may be permitted except in compliance with the City's flood control regulations (Chapter 16-6 of the Chicago Municipal Code).[6] Development is permitted within the 100-year floodplain if the new development does not raise the flood elevation by more than one foot within the affected hydraulic reach of the stream. New buildings are permitted in the floodplain only if they are protected from damage from the 100-year flood because they have been raised above the 100-year elevation or have been otherwise flood proofed.

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[3] O'Hare Modernization Program, Final Draft, CTE, December 15, 2002.
[4] FEMA CLOMR Application for Willow-Higgins Creek Relocation, City of Chicago O'Hare Modernization Program, August 16, 2004
[5] Airport Environmental Handbook FAA Order 5050.4A, Federal Aviation Administration, October 8, 1985. pp. 47-51.
[6] City of Chicago Code of Ordinances Chapter 16-6, Flood Control.

5.13.1.2 Thresholds of Significance

Pursuant to Executive Order 11988 and USDOT Order 5650.20, FAA Orders 5050.4A (*Airport Environmental Handbook*) and 1050.1E require an analysis to indicate if floodplain encroachment would result in one or more of the following construction- or flood-related impacts: (1) a considerable probability of loss of human life; (2) likely future damage associated with the encroachment that could be substantial in cost or extent, including interruption of service or loss of a vital transportation facility; or (3) a notable adverse impact on natural or beneficial floodplain values.

As stated in FAA Order 5050.4A, Paragraph 47(e)(12)(g)(3), if any of the above criteria are applicable, the floodplain encroachment would be considered significant and would require a finding by the FAA, as part of its decision on the action, that there is no practicable alternative and that the action conforms to applicable state and/or local floodplain protection standards. Applicable standards must be identified in the EIS, along with the agencies that have jurisdiction.

If no significant encroachment within a base floodplain as defined above would take place, it may be assumed that the proposed action would not result in a significant floodplain impact, and no further analysis is required by FAA Order 5050.4A.

FAA Order 1050.1E (Appendix A, 9.3) states:

> Floodplain impacts would be significant pursuant to NEPA if it results in notable adverse impacts on natural and beneficial floodplain values.

In evaluating significant impacts, this Order further states (Appendix A, 9.4a):

> analysis includes the following as applicable to the action: (1) Further consideration of the practicability of any alternatives. (2) Inclusion of all practicable measures in the design of the proposal to minimize harm and to restore and preserve the natural and beneficial floodplain values affected. Commitments to later compliance with special flood related design criteria or the imposition, in advance, of protective conditions may be warranted in some situations. (3) Evidence that the action conforms to applicable State and local floodplain protection standards.

5.13.1.3 Methodologies

In general, the Alternatives analysis will evaluate potential floodplain impacts using estimates of increased impervious surfaces and estimates of the resulting increase in flood waters. The analysis will focus on whether accumulation of stormwater would overwhelm existing or proposed drainage systems, causing increased volume and rate of stormwater such that the increase would:

- harm airport visitors or neighboring communities,
- significantly disrupt air passenger service at the Airport,
- damage property,
- cause upstream or downstream flooding in creeks off the airport property, or

- degrade the values of the natural floodplain such as its ability to promote surface water infiltration, support of aquatic habitat, and provide natural flood control.

5.13.2 Baseline Conditions

The Airport is within three watersheds: 1) Willow-Higgins Creek watershed, 2) Crystal Creek watershed, and 3) Bensenville Ditch watershed. These watersheds are drained by streams that generally flow from west to east into the Des Plaines River. The streams within the Willow-Higgins Creek watershed include Willow Creek, Higgins Creek, and Willow-Higgins Creek (see **Exhibit 4.4-4** in **Chapter 4, Affected Environment**). The stream within the Crystal Creek watershed is Crystal Creek. The stream within the Bensenville Ditch watershed is Bensenville Ditch. This stream is called Silver Creek south of the Airport property. These three watersheds have minimal topographical relief and relatively uniform gradients.

The existing floodplain for the Willow-Higgins Creek watershed, located on the North Airfield, and the Crystal Creek and the Bensenville Ditch watersheds, located on the South Airfield, is shown on **Exhibit 4.4-4**. Detailed explanations of each of the watershed drainage areas are provided in **Appendix K**, **Water Quality**.

The 100-year floodplains for the three watersheds on the Airport are described below.

5.13.2.1 Willow-Higgins Creek Floodplain (North Airfield)

The existing Willow-Higgins Creek floodplain occupies approximately 116.1 acres of on-Airport property. The Natural Resources Conservation Service (NRCS) developed the Willow-Higgins Creek hydrologic and hydraulic models (TR-20 and WSP-2, both commercially-available) for its Lower Des Plaines Tributaries Study.[7] TR-20 is a hydrologic model that determines flood hydrographs. WSP-2 is a hydraulic model used to determine flood profiles.

These models were updated to evaluate floodplain conditions in the North Airfield Drainage and Pollution Control Study.[8] The WSP-2 model was updated to include field surveys of hydraulic conditions in the watershed, improvements to culverts, channel realignments, and channel improvements. The TR-20 model was updated to incorporate Bulletin 70 precipitation data and changes in the drainage area. The floodplain of Willow-Higgins Creek is shown on **Exhibit 4.4-4**. This exhibit incorporates the changes in the floodplain as a result of the North Airfield Drainage Improvements, the operation of the Touhy Avenue Detention Basin, and the operation of Structure 140. The North Airfield Drainage Improvements, and the construction of the Touhy Avenue Detention Basin and Structure 140 have been completed and are operational. Combined, these projects resulted in approximately 458 acres of Airport property no longer being within the previous floodplain associated with Willow-Higgins Creek.

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[7] Lower Des Plaines Tributaries Watershed, Cook, DuPage and Lake Counties, Illinois. U.S. Department of Agriculture Soil Conservation Service. 1987. (The U.S.D.A. Soil Conservation Service is now named USDA Natural Resource Conservation Service.)

[8] Chicago O'Hare International Airport, North Airfield Drainage and Pollution Control Study, Consoer Townsend & Associates, 1993.

5.13.2.2 Crystal Creek Floodplain (South Airfield)

IDNR-OWR developed the most recent Crystal Creek hydrologic model (HEC-1, commercially-available) and hydraulic model (HEC-2, commercially-available).[9] This report studied the flooding problems in Franklin Park and Schiller Park and created the current regulatory floodplain model for existing conditions between the affected villages and the start of the creek at the South Detention Basin's outfall.

The limits of the Crystal Creek floodplain on Airport property are shown in **Exhibit 4.4-4**.[10] The Crystal Creek floodplain covers approximately 6.3 acres of Airport property and extends only into undeveloped grassed areas in a narrow strip directly adjacent to the existing creek banks and does not affect any airport facilities. Below the South Detention Basin, the Crystal Creek floodplain is limited and is mostly the result of overland flow of stormwater (see **Exhibits 5.7-1, 5.7-2** and **5.7-3** in **Section 5.7, Water Quality,** for views of the existing watershed and the drainage basins). More detailed information on the South Airfield drainage system is included in **Appendix K**, **Water Quality.**

The South Detention Basin is located in the southeast quadrant of the Airport. This basin provides stormwater detention and captures stormwater contaminated with deicing chemicals. The total drainage area that currently flows to the South Detention Basin is approximately 1,809 acres. This basin receives nearly all stormwater within the watershed that contains deicing fluid. Meltwater from Snow Dump D-3, which is located on the west side of the Airport, also drains to the South Detention Basin. This basin has a maximum storage volume of 1,185 acre-feet and covers approximately 115 acres. The high water elevation in the South Detention Basin is 640 feet, which is dictated primarily by the connecting sewer elevation. When water levels in the South Detention Basin exceed this elevation, stormwater overflows the basin and into Crystal Creek.

A recently completed pump station and 24-inch diameter force main allows the DOA to discharge stormwater from the South Detention Basin to an existing Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) Tunnel and Reservoir Plan (TARP) dropshaft located near the southeast corner of Des Plaines River Road and Irving Park Road.[11] This project enables DOA to pump from the South Detention Basin at a higher rate than previously allowed. Under terms of the DOA's permit with MWRDGC, stormwater can be discharged directly into the Des Plaines River at 23 cubic feet per second (cfs). Implementation of the TARP improvement project decreased the frequency of overflows to Crystal Creek to approximately once every 14.2 years. Overflows to Crystal Creek can cause water quality and flooding problems downstream.

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[9] Strategic Planning Study For Flood Control, Crystal Creek, Villages of Franklin Park and Schiller Park, Illinois, Illinois Department of Transportation, Department of Water Resources, March 1991.

[10] NPDES Sheets and Floodplain Information (CD), CTE Engineers, January 29, 2003.

[11] O'Hare Modernization Program, South Detention Basin Information for the Existing Airfield, CTE Engineers. December 15, 2002.

5.13.2.3 Bensenville Ditch Floodplain (South Airfield)

The existing FEMA floodplain delineation on the most recent Flood Insurance Rate Map (panels 358 and 359 of the Flood Insurance Rate Map (FIRM) for Cook County dated November 6, 2000) indicates that the area upstream of Irving Park Road is classified as Zone A, which means that no base flood elevations have been established. In general, Zone A designations are used for areas where no hydraulic modeling was performed in the preparation of the FIRM map. These delineations tend to be less accurate than areas that are modeled.

The HEC-1 and HEC-2 models were completed in 1992 by the IDNR-OWR (presently IDNR) and reflected the latest improvement projects for the Bensenville Ditch.[12] The improvements include floodplain mitigation measures constructed for the U.S. Postal Service facility and channel improvements upstream of the Airport. These models were again modified to account for the most recent on-Airport sub-basin routing changes and for changes in the accepted method for applying Bulletin 70 rainfall data. These changes are incorporated to develop a flood profile for Bensenville Ditch between York and Irving Park Roads. This flood profile was then used with the recent DOA topographic mapping to delineate the floodplain. **Exhibit 4.4-4** in **Chapter 4, Affected Environment,** shows this floodplain, which covers approximately 98.5 acres of Airport property.[13] The floodplain does not affect any existing Airport facilities. The floodplain consists of undeveloped grassy areas and the recently developed floodplain storage areas that are part of the U.S. Postal Service facility.

5.13.3 Alternatives Analysis – Build Out

The following sections present information on the potential environmental impacts on floodplains by each of the alternatives retained for detailed evaluation. Only the Build Out phase is presented because this represents the time at which all components of the Build Alternatives would be completed, operational, and all potential impacts would be realized.

The Willow-Higgins Creek floodplain currently occupies approximately 116.1 acres of the North Airfield (1.7 percent of airport lands). The Crystal Creek floodplain occupies approximately 6.3 acres of airport property (less than 0.1 percent of airport lands), and, based on a recently developed flood profile in conjunction with recent City of Chicago Department of Aviation topographic mapping, the Bensenville Ditch floodplain occupies approximately 98.5 acres (1.4 percent of airport lands). Floodplains store water during storm events and help dissipate energy associated with floodwaters. The proposed changes to the watersheds within the Airport property could affect the area of the designated floodplain and can potentially result in flood-related impacts.

[12] Bensenville Ditch Floodway Construction Permit Applications, Illinois Department of Natural Resources, Department of Water Resources, May 1992.
[13] NPDES Sheets and Floodplain Information (CD), CTE Engineers, January 29, 2003.

5.13.3.1 Alternative A – No Action

For the North Airfield, the previously approved drainage improvements (the North Airfield Drainage Improvements, construction and operation of Structure 140, and the Touhy Avenue Detention Basin) would continue to operate. The implementation of these drainage improvements would result in a reduction of the floodplain associated with Willow-Higgins Creek. The City of Chicago has prepared a CLOMR requesting that FEMA revise the floodplain maps associated with Willow-Higgins Creek.

For the South Airfield, the South Detention basin, which receives nearly all the stormwater that contains deicing fluid, would continue to occasionally overflow into Crystal Creek. The recently completed pump station and 24-inch diameter force main that enables DOA to discharge stormwater from the basin to a MWRDGC drop inlet located near Des Plaines River Road will continue to flood periodically. It is estimated that flooding would occur once every 14.2 years.

There would be no future encroachment upon the floodplains of the North or South Airfields under the No Action Alternative.

5.13.3.2 Alternatives C, D, and G

The implementation of the Build Alternatives (C, D, or G) would not result in any increase in floodplain areas. The drainage improvements proposed by the City of Chicago would be sized to accommodate the increase in runoff from the North Airfield that would occur under Alternatives C, D, or G. As described above, these detention basins would actually reduce the size of the floodplain in the vicinity of the Airport and would result in flows that are similar to or less than those that currently occur in the creeks in the Airport vicinity. In addition, each of these Build Alternatives would include the development of detention basins on the South Airfield that would accommodate the increase in runoff that would occur as a result of the increase in impervious surfaces. Although Alternatives C, D, or G would increase the amount of impervious surfaces at the Airport (see **Table 5.13-1**), the proposed detention basins would be designed to release runoff in a manner that does not increase the flow rates of any of the three creeks that drain the Airport. Additionally, throughout the phased implementation of the components of any of the Build Alternatives, required detention capacity would be in place and operational to support new airfield and other aviation-related facilities prior to taking existing facilities out of service.

Implementation of the Build Alternatives would encroach upon the floodplains of the North and South Airfields by construction within the floodplains and relocation of the floodplains. The FAA has considered whether there are practicable alternatives to this encroachment. See **Section 5.12, Wetlands** for further information. The improvements noted above, which would reduce the size of the floodplains on the Airport, would ensure that no significant encroachment impacts to the existing floodplains would occur, and that the increase in runoff from the Airport is accommodated without having an adverse effect on floodplains, on stream habitat, or on streambank erosion.

TABLE 5.13-1
INCREASE IN IMPERVIOUS SURFACES FOR EACH ALTERNATIVE

	Increase (Acres)			
		Build Alternatives		
Construction Phase	**Alternative A (No Action)**	**Alternative C**	**Alternative D**	**Alternative G**
Construction Phase I	0	10	10	10
Construction Phase II	0	321	321	321
Build Out	0	669	492	795
Total (Acres)	**0**	**1,000**	**823**	**1,126**

Source: Crawford, Murphy and Tilly, Inc. [TPC] analysis, September 2004.

In addition, IDNR-OWR has conditionally concurred with revised peak flood flows and flood profiles as submitted by the City of Chicago.[14] The concurrence is conditional and is based on the review and approval of "as built" plans of the authorized work on these detention basins.

Assuming completion of the drainage improvements and acceptance of the CLOMR by FEMA, and the construction of the detention basins on the South Airfield, none of the projects included in Alternatives C, D, or G would significantly encroach into any of the floodplains that exist in the Airport vicinity, and therefore no significant floodplain impacts would occur.

5.13.4 Potential Mitigation Measures

Based on the above analyses, the FAA concludes that no significant impacts would occur under any alternative. Given that no significant impacts related to floodplains would occur under any of the Build Alternatives, no formal mitigation procedures have been identified.

5.13.5 Summary

Assuming completion of the drainage improvements and acceptance of the CLOMR by FEMA, and the construction of the detention basins in the North and South Airfield areas, none of the projects included in Alternatives C, D, or G would encroach into any of the floodplains that exist in the Airport vicinity. Therefore, no significant encroachment on floodplains as defined in EO 11988 would occur under the No Action Alternative (Alternative A) or any of the Build Alternatives. Thus, FAA concludes that there would be no significant impacts on floodplains. Each Build Alternative includes similar increases in impervious surfaces and runoff.

[14] Letter from Gary W. Jereb, P.E., Illinois Department of Natural Resources to John Plezbert, City of Chicago Department of Aviation, May 18, 2004.